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Keynote Speaker

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Biofilm based bioremediation of chlorinated contaminants

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Stormwater runoff has been implicated as a major cause of (re)-contamination of sediment near stormwater and wastewater effluent discharge points in urban watersheds as well as Department of Defense sites. Removal of persistent organic pollutants (POPs), specifically polychlorinated biphenyls (PCBs) from stormwater, thus preventing or significantly reducing the discharge to urban discharge areas including aquatic sediments is a priority due to the ability of these contaminants to enter the food chain, where they can present potent toxic and carcinogenic properties. Commonly adop-ted sediment remedies include dredging and capping, which are associated with challenges including disruption of existing habitat and high cost. While in situ microbial degradation of PCBs represents an improvement, previous attempts have failed because of PCB stability, low bioavailability, low abundance and activity of indigenous PCB-degrading microorganisms. The high efficiency of activated carbon (AC) and other sorptive substrates to quickly adsorb PCBs from sedi-ments has been demonstrated. Co-localizing PCB-degrading microbes onto surfaces of sorp-tive particles as biofilms and utilization as a delivery system pro-vi-des a novel approach to address PCB contamination. This approach can also be modified for treatment of contaminated stormwater and wastewater effluent prior to discharge. The effect of stormwater containing PCBs on the sediment quality was evaluated for multiple locations in Baltimore Harbor, where sediment core samples were evaluated and compared to historical PCB concentrations. Also, current strategies for bioremediation of PCBs in stormwater retention cells and well as in sediment were evaluated.

Biography

Dr. Birthe Kjellerup is an Associate Professor in the Department of Civil and Environmental Engineering at the University of Maryland with a secondary appointment in BioEngineering. Dr. Kjellerup began her training at Aalborg University, Denmark, in the Department of Life Sciences where she received her PhD in 2004 with her thesis titled "Monitoring, detection and control of bacteria involved in biocorrosion in district heating systems". As a part of her graduate studies she traveled to the international training center for biofilm research, the Center for Biofilm Engineering (CBE) in Montana, and has continued collaboration with CBE in her current position. Dr. Kjellerup then moved to Baltimore to become a postdoctoral fellow at the Center of Marine Biotechnology to continue her work on environmental biofilms and bioremediation. Dr. Kjellerup became an Assistant Professor in 2009 in the Biology Department at Goucher College, Baltimore, where she stayed until 2014. In January 2015 she accepted a position as Assistant Professor at University of Maryland at College Park. Since arriving at University of Maryland, Dr. Kjellerup has continued her research and teaching interests in biofilms. Dr. Kjellerup has trained as an environmental engineer and microbiologist specializing in beneficial and detrimental aspects of biofilms for over 20 years. She has pioneered the application of biofilms on sorptive materials for bioremediation and energy recovery and used them, along with chemical analysis, to develop novel bioremediation strategies and approaches for groundwater and stormwater clean-up. Dr. Kjellerup has a strong background in organizing highly skilled colleagues in multidisciplinary research. She also has a strong working knowledge of budget development and has obtained nearly $4 million from local (DC Water at Blue Plains), state (Maryland State Highway Administration) and national (SERDP, USDA) funding agencies in the past 7 years. Dr. Kjellerup has served on more than 20 graduate committees and is the primary advisor for 7 graduate students committees (5 PhD, 2 Masters). She has also mentored 5 postdoctoral fellows Currently two in the research group), where one has progressed to an international faculty in addition to more than 25 undergraduate students with the majority at University of Maryland.